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Geographic Analysis and Monitoring Program

Urban Dynamics Project

Statement of Problem

Metropolitan areas in the United States are growing at unprecedented rates, creating extensive urban landscapes where farmland, wetlands, forests, and other natural ecosystems once existed. The growth of the Nation's urban and suburban regions is not a new phenomenon, but the

consequences of a growing population that enjoys high per capita consumption of resources and increasingly resides in urbanized areas has thrust the issue of sustainable development on the political scene. Urban growth has many environmental, ecological, and resource impacts. For example, natural habitats are being altered in ways that affect animal and plant communities often due to the increasing interface with human habitat. Reliable sources of clean drinking water are being exhausted in regions experiencing rapid growth. Natural resources necessary to fuel the growth of urban infrastructure (e.g. crushed rock, sand, and gravel) are not as readily available and harder to transport. For these and other reasons it is critical that the national consequences of urban change be understood in order to address sustainable development strategies.

Objectives

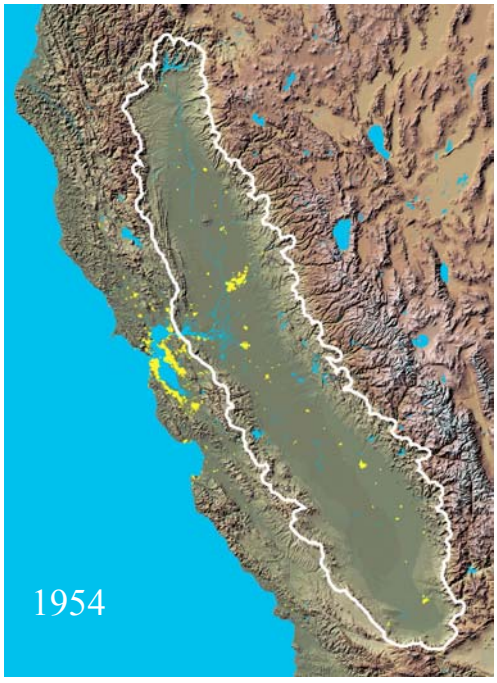
The Urban Dynamics project seeks to understand what changes are occurring in urbanizing regions, why these changes are occurring, and what effects these changes have on abiotic (physical), biotic (biological), and anthropogenic (human) systems. The objectives of the project are to enhance scientific understanding of the urbanization process in the context of natural and social systems, measure its consequences, and inform policymakers and the public of likely

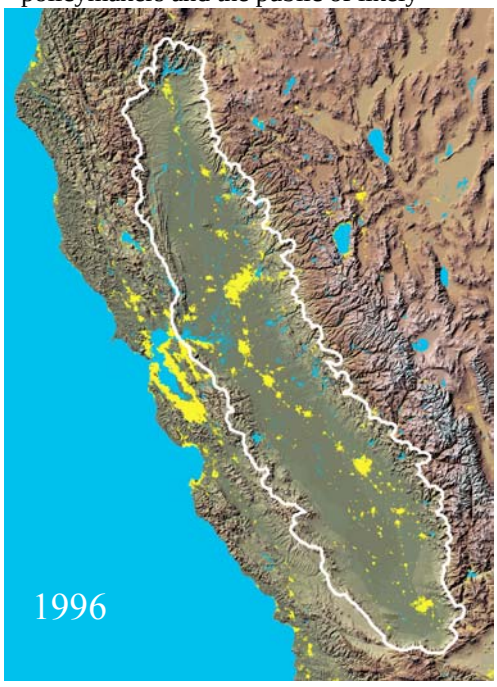
impacts given alternative future scenarios.

Relevance and Impact

Americans are concerned with urban growth and how it affects their lives. A review of newspaper headlines around the country shows that quality of life concerns such as lengthy

commutes to work, vulnerability to natural hazards (e.g., floods, fires, earthquakes), loss of open space, and air and water pollution are foremost in the public eye. At the same time Americans recognize that growth of urban areas creates jobs and places to live and contributes to economic well being of an area. Political leaders and policy and decision-makers are under pressure to implement approaches and find solutions that address environmental issues while stimulating economic growth and maintaining the vitality of their communities. This project will develop the scientific information and tools to help anticipate and evaluate the responses of the landscape to human-induced land transformation and to predict the environmental effects. This information will help decision-makers promote a region's sustainable development to protect its ecosystems. It will assist in planning





environmental remediations necessary to protect human health, evaluate its natural resources and hazards, and develop the tools to evaluate and communicate the impacts of management and regulatory decisions.

Strategy and Approach

The Urban Dynamics project will conduct research that integrates historical maps with remotely sensed, socio-economic, and physiographic data to characterize the dynamics of land transformation due to urbanization. Using historical maps, aerial photographs, and Landsat satellite data, researchers will assemble retrospective urban land use databases to reflect several decades of change. Rates and trends of change will be determined and related to land use history and driving forces, which are then used to analyze the impact of urbanization on the landscape, and to model future urban growth under alternative scenarios. The project will pursue of the following tasks: (1) conduct long-term monitoring of the state and trends of the Nation's metropolitan areas as critical input for regional and national policy decisionmaking, (2) analyze and interpret the record of land use dynamics that includes land use and land cover change to enhance understanding of the physical and social drivers of urban land use change, (3) analyze, understand, model, and predict the consequences of historical and projected land surface changes on ecosystem health, taking into account natural and human-induced stimuli at regional, and national scales, and (4) develop methods to communicate research results and assist decisionmakers with ecosystem strategies and sustainability.

For More Information

William Acevedo
650-329-4383
wacevedo@usgs.gov